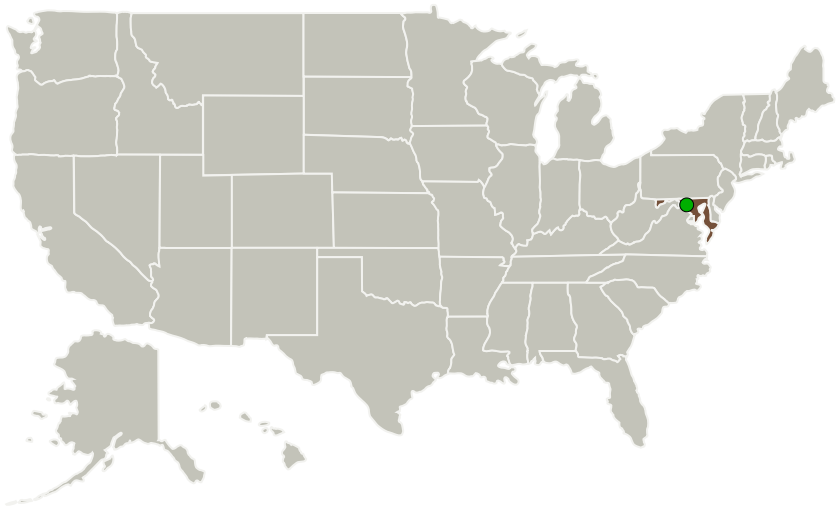
Multi-Purpose Radio Signal Generation System, Phase II

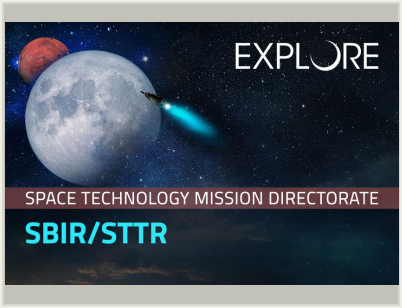
Completed Technology Project (2011 - 2013)

Project Introduction

Early Hardware-in-the-Loop (HWIL) simulation is essential to early retirement of space mission development risks. Upcoming NASA missions such as MMS involve complex high Earth orbits making the use of GPS difficult, though NASA has developed GPS receivers capable of performing in these environments. Space GPS simulation needs are typically seen as a niche market, and the resulting solutions, which are often simply adaptations of terrestrial products, can be sub-optimal and at best handle simple, low dynamic LEO missions. Further, space simulation solutions are frequently inflexible and cannot be modified by the end-user. Given the broad but unique needs of HWIL testing involving RF systems, Emergent proposes to develop the Multi-purpose Radio Signal Generation (MRSiG) system to address these needs, which are essential to early risk mitigation. The MRSiG system will provide for easy mission specific customization and generation of multiple waveforms used in ground testing applications and will return the expertise to simulate these complex environments to NASA. MRSiG will accomplish this difficult task by harnessing the latest in open Software Defined Radio (SDR) technologies. Simulation complexity for RF signal generation is moved into software, enabling the emulation of many RF waveforms/protocols including, but not limited to GPS, 802.11, S-Band, WiMAX, etc.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Emergent Space Technologies, Inc.	Lead Organization	Industry	Greenbelt, Maryland
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Project Transitions

June 2011: Project Start

May 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139137)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Emergent Space Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Kenn L Gold

Co-Investigator:

Kenn Gold

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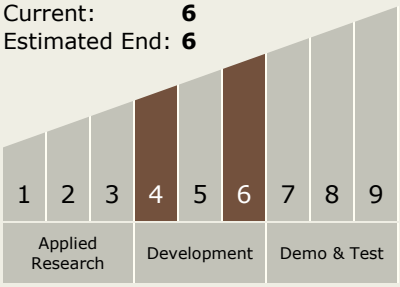
Completed Technology Project (2011 - 2013)

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.4 Attitude Estimation Technologies
    - TX17.4.3 Attitude Estimation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System